

I fed him on boiled eggs and prepared mockingbird food, and a few meal worms.

One evening about the last week in December, 1900, while I was watching him bathe, evening being his favorite time for bathing, the poor little fellow's head dropped over the side of the bath, and after a few convulsive twitches he was dead. I had not time to make him into a skin, so sent him to a taxidermist, who unfortunately did not take the sex.—J. H. AMES, *Toronto, Ontario.*

Clark on the Classification of Birds.—Mr. Clark's most able and interesting article on the classification of birds, in 'The Auk' for October (XVIII, pp. 370-381) while showing the great value of pterylography, is one more example of the danger of attempting to base a system of classification on one character. Also it is a warning not to use external characters for the definition of great groups, but rather to rest them on the firmer foundation of characters afforded by the skeleton. This remark is naturally aimed at the combination of Tinamous and fowls to form one of the "old, worn-out 'orders'" complained of by the author at the commencement of his paper.

Mr. Clark assumes that changes of habit are *soon* (italics mine) followed by changes of structure, and although nothing is brought forward to sustain this statement, it may be freely admitted that many features of a bird's skeleton are at least adaptive, as in all other vertebrates, and that one of the stumbling blocks in the path of "the avian taxonomist" is the extent to which morphological structure may be obscured by adaptation. Nevertheless, this modification does not extend to the more important features, and particular objection must be made to the assertion that the skull is specially liable to adaptive changes. For while the external shape may be influenced the fundamental structure of the skull is unchanged, and although a passerine bird, for example, may have the slender bill of a honey creeper or the wide and short beak of a swallow, the skull is built on the same plan. Again, no feature is more characteristic of the Passeres than the structure of the hypotarsus, and while pterylosis may unite "Passeres and Picarians," the upper end of the tarsus shows at a glance whether or not, from Wren to Raven, a bird is a member of the upper 6000 of avian society. That the so-called picarian birds seem to, and do, form a heterogeneous assemblage is believed by many ornithologists to be due to the fact that they represent what may be called Nature's attempts to construct a passerine bird, being so many stages in the line of evolution, on the one hand reaching towards the higher type of birds, on the other retaining traces of their ancestry and of their affinity to other forms, while over all is the mantle of specialization along certain lines.

But if Mr. Clark thinks that modifications of the skeleton are adaptive and due to mechanical causes, what does he think of the main features of the pterylosis? If these be not due to adaptation, then there is no such

thing; this at least is my own view, and no better example could be brought forward to sustain it than that of the Hummingbirds which Mr. Clark cites as examples of the primitive pattern of pterylosis. Some years ago I wrote: "The pterylosis of all birds is more or less adaptive, having some direct relation to their habits, and this adaptation is well shown in hummingbirds. The bare tracts on the nape and along the throat allow the neck to readily lie against the middle of the back, or to bend downward over the point of the breast bone, while the bare spaces under the wing and along the sides of the body permit the wings to be easily closed and applied to the body, the side spaces conforming almost exactly to the curve of the edge of the folded wing. The large bare space on the under side, found in nearly all birds save water fowl, is mainly to allow the warmth of the body to be directly applied to the eggs during incubation, and in birds like ducks and penguins (also auks) which are densely or completely feathered beneath, a bare spot is present during the breeding season." Thus the pterylosis of the hummingbird is primitive because it shows few or no modifications of its purely adaptive features.

It is interesting to note that the pterylosis of the great struthious birds bears out the two theories that these birds are descended from ancestral forms which flew, and that the apteria are due to mechanical causes. For while it is commonly stated that these birds are evenly covered with feathers, yet, according to that careful observer, Mr. Pycraft, they have well-defined, if small, apteria, and these bare places are best defined in *Rhea*, the genus which has the largest wings.

Finally, while hoping that Mr. Clark may continue those careful pterylographical studies which are yielding such good results, and granting the great value of the pterylosis as an *aid* to classification, I must confess that it seems rank heresy to hold that primary, fundamental structural characters are more susceptible to modification than are secondary external characters. — F. A. LUCAS, *Washington, D. C.*